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ABSTRACT

Fourth grade students' miscues occurring in signaled sentence combining exercises were compared with their reading miscues in a study relating cognitive style to miscue analysis of reading and writing. The records of 16 students were used, with reflective students and impulsive students so designated on the basis of their miscues per one-hundred words. Miscues of phonology (reading) and spelling (writing) correlated very highly, indicating that reading and writing are similar processes. Miscues of addition and substitution were more frequent in reading, while miscues of omission were more frequent in writing. Thus, miscues of phonology and spelling have as their source the manner in which linguistic units are stored in the mind and the manner in which rules relate these underlying forms to surface forms. Regarding cognitive style, the reflective students showed a much higher correlation between their reading and writing miscues than did either the total group of students or the impulsive students. Applying the results to instructional practice, teachers could teach reading and writing as mirror images of the same process so that similarities could be strengthened and differences emphasized. It also appears that reading and writing lessons could be designed for groups of students who have similar records. (RL)

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Cognitive Styles and Miscue Analysis of Reading and Writing

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In an attempt to understand more fully how young people process written language both in reading and writing, the decision was made to make an analysis of miscues that students produce in their processing of written language and to relate findings from analysis of these miscues to differing cognitive styles. Some problems were immediately evident once the decision was made since, although many studies have been completed on the analysis of miscues which occur in the reading process, few, if any, have been attempted on the writing process. The same might be said of relating cognitive styles to findings from miscue analysis. Although there have been a number of studies which deal with miscue analysis of reading and which relate the patterns found in miscue analysis with the cognitive styles of the individuals who produce the miscues, there has been no attempt to relate cognitive styles to the manner in which students process written language in both reading and writing as seen in a miscue analysis of these two modes of encoding or decoding meaning into or from the written word.

In any case, the idea of differing cognitive styles in learning is hardly new. Kagan and Kogan (1970) in their review of the literature date the study of individual variation in learning styles as far back as Cattell (1890). Although there is undoubtedly a measure of truth in the observation of Kagan and his colleague, the study of cognitive styles using current categories and terms goes back only two or three decades. The truth of the latter ascertainment can be determined from the fact that Wolitzky and Wachtel (1973) trace the emergence of cognitive styles back to the late 1940's when studies in the styles of field dependence were being performed. In any case, the categories and terms used in the study of cognitive styles are nicely represented by Wardell and Royce (1978) in chart form.

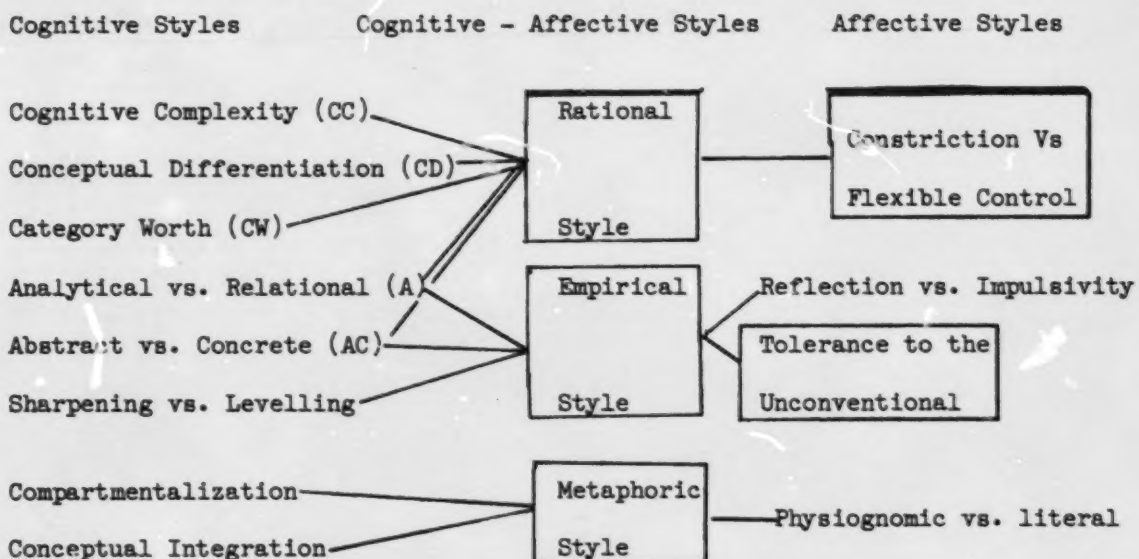


Chart I: Cognitive Styles (from Wardell and Royce 1978:487)

For purposes of this study, only a few of the above categories will be abstracted from the chart and presented for more detailed treatment. These are as follows:

- (1) Abstractness -- concreteness
- (2) Sharpening -- levelling
- (3) Field dependence -- independence
- (4) Reflectivity -- impulsivity

The first of these cognitive styles, abstract as opposed to concrete, refer to the preference for concept formation and manipulation generally, as distinct from conceptual differentiation which is concerned with differentiating particulars. The abstract person uses more information and more strategies to solve problems than the concrete person. The concrete seems to assume that structures are restricted to, or dependent upon, physical attributes of activating stimuli. (See for instance Wardell and Royce, 1978:480.)

Levelling as opposed to sharpening is seen as a tendency to be extremely sensitive to minute details. People who are sharpeners are inclined to respond excessively to fine nuances and small differences in stimuli. They are likely ". . .to exaggerate change, and to keep adjacent or successive stimuli from fusing or losing identity . . ." (Klein, 1951:332). On the other, hand, ". . . levelers are characterized by maximal assimilation effects, and by memory organizations in which the fine shades of distinctions among individual elements

are lost'" (Wardell and Royce, 1978:480, quoting Gardner et al. 1959:219). This cognitive style has for its principle measure the Schematizing TEST which " . . . requires subjects to make size judgements of a series of squares of progressively increasing size" (Kagan and Kogan, 1970:1304).

The field - dependence - independence dimension of cognitive style has been largely developed by Witkin et al. (1954). People who are field dependent organize their stimulus field in such a way that what they perceive as a whole dominates all of the parts within that field. Aspects of the field are fused. They have a synthetic approach to their perceptual field. In contrast, field independent people have a more analytic approach to their organization of the perceptual field. Aspects of the field are experienced independently of the organized field. They find it easy to separate individual stimuli from their background in an embedding context (Witkin, et al. 1962). From a study of Witkin (1950, 1962 and 1967), Davey (1976:114-115) summarizes the differences between field dependent and field independent people in the following fashion:

Field independent people appear to develop a sense of identity that is separate from the group. Field dependent people tend to rely on other sources for definition of who they are and tend to be generally more sensitive to social stimuli. They also appear to be more attentive to human faces and to recall them better than do people who are field independent.

The notions of field dependence - independence come out of studies in Gestalt psychology and in experiments dealing with figure - ground configurations in the

perceptual field.

The existence of field dependence or field independence is most often established through the administration of a hidden picture test. This test can take the following form:

Pictures are presented, each depicting a scene. Each picture has objects hidden in it. A child finding less than a certain number of hidden items is considered field dependent. Such a test was administered by Sabaroff and Fray, (1978:217) in their experimentation.

However, field dependence or independence can also be ascertained by the embedded figures test or the rod and frame test. In the former, the examinee must select a geometrical design when "... the figures are embedded in more complex, shaded figures, with the task being to locate the good - form figure in the complex . . . the embedded dimension of FD-I, which has been related to reading achievement" (Dermott et al., 1979:208). In the latter,

Verticalness, however, is the main feature of this dimension and requires the subject to rotate a rod embedded in a tilt frame so that it appears to be straight up and down like a plumb line. The more nearly the person adjusts the rod within the frame to an upright position according to gravity, over an average of eight trials, the more field independent he is. The more nearly the subject adjusts the rod perpendicular to the base of the tilted frame, the more field

dependent the person is."

There have been few projects relating cognitive style to reading skills using the preceding dimensions with the exception of studies done on the relationship of field dependence - independence to various aspects of the reading process. These include: Davey (1975), Buriel (1978), Dermott et al. (1979), Sabaroff and Fray (1978) and others. Most of the projects relating these styles to reading have been concerned with impulsivity - reflectivity or reflection.

Studies on the impulsivity - reflectivity dimension in cognitive style seem to have received their greatest impetus from Kagan and his colleagues. This dimension makes a distinction between reflective individuals who are slow and accurate and impulsive individuals who respond fast and innaccurately. The distinction is most often identified in individuals through the use of the Matching Familiar Figures (MFF) test of Kagan (1966). Interestingly enough, impulsive children are generally treated as being deficient in certain areas.

For example, impulsive children have been found to show cognitive deficits in such areas as problem - solving (e. g. Ault, 1973; McKinney, 1973), verbal mediation (e. g. Camp, 1977), and information seeking (e. g., Finch and Montgomery, 1973), and to respond less impulsively under response - cost contingencies than direct reinforcement (Erickson, Wynn & Routh, 1973; Nelson, Finch and Hooke, 1975) (Kendall, et al. 1980:175).

Often the reflective style has been described by stating that the

reflective individual carefully peruses all of the alternatives that are presented and, as a consequence, spends a correspondingly large amount of time evaluating the problem as the number of task alternatives increases. Impulsive individuals, on the other hand, tend to formulate hypotheses rapidly without considering a great number of the alternatives and, consequently, spend little time considering problems in formulating hypotheses. This description accords with Lesiak's (1978:334) observation on this dimension.

Some children accept and report the first hypothesis that comes to them and act upon it with only the slightest consideration for its appropriateness or validity (impulsive). Others devote a long period of time to study and reflect and censor many hypotheses (reflective).

Kendall et al. further describe impulsivity by stating that it " . . . connotes an incomplete task analysis and therefore should result in rapid inaccurate responding that is not affected by increases in task alternatives" (1980:177). Wardell and Royce (1978:480) report that " . . . analytical concepts are favored by 'reflective' children, and relational concepts by 'impulsive' children." The reason for this can be found in the fact that affective styles evidently impinge on cognitive styles. Wardell and Royce (1978:483) describe this concept as follows:

For the impulsive child, emotional states and affective traits intrude to disrupt the evaluation of possible answers under conditions of response uncertainty. Responses show less scanning of alternatives and less concern for validity, probably because either intrusive

emotional states are overwhelming (e. g. hyperactivity) or concern about negative results is underdeveloped (e. g. psychopathy).

This would account for the fact that Messer (1976) sees the impulsives exercising not only " . . . less cognitive control than do reflectives but also less behavioral control as well" (Quoted from Wardell and Royce, 1978:485). From this, it would be expected that the impulsive - reflective dimension would intrude on the social behavior of young children. Readence (1975:40-41) demonstrates as much when he states:

The reflective watches a group before joining them and often retreats to solitary tasks. The preschooler also shows a preference to avoid activities that are potentially dangerous such as going too high or moving too rapidly on playground swings. . . . On the other hand, the impulsive child is less likely to be easily distracted when involved with a school task. He chooses less difficult tasks and works at them for shorter periods of time. The impulsive child enjoys social interaction. He demonstrates a zeal for gross motor activities in the preschool years and disregards any potential risk.

In addition to this, " . . . reflectives endorsed significantly higher importance to being motivated for success than impulsives, . . . and impulsives endorsed significantly higher importance than reflectives to being motivated for speed . . . " (Kendall et al., 1980:179). Besides this, it appears that reflective individuals think out loud significantly more than the impulsives. In the minds of Kendall and his colleagues there is some question about the

significance of this thinking out loud. They state:

"However, the present findings . . . may simply indicate the impulsives lack of a task strategy. That is, the fact that reflectives thought out loud more than impulsives may indicate that impulsives were not self-directing their performance rather than that they had internalized their self-directed talking" (1980:179).

It would seem to be unclear to these authors whether impulsives are involved with a cognitive deficit which needs remediation or whether the reflectives simply verbalize their strategies more. For the first, they state "Reflectives verbalized more 'thinking out loud' than did the impulsives. . . ." thus intimating that reflectives and impulsives simply differ in their preferred modes of manipulating conceptual material. For the second, they state that " . . . since the 'thinking out loud' code is the only 'strategy' code . . . this finding supports the notion of a task strategy deficit in impulsives" (Kendall et al. 1980:179). In all probability, the latter viewpoint prevails since the senior author is involved in a program for the treatment of impulsives (Kendall and Finch, 1979). In any case, it would seem that adults are very similar to children on the reflective - impulsive dimension of cognitive style, even requiring the same kind of treatment. Kendall and his colleagues describe adults in this fashion:

Cognitively impulsive adults appear to lack a task strategy and, given the emphasis on cognitive problem solving within the cognitive - behavioral intervention, the treatment may prove therapeutically

viable. . . . the treatment provides external pacing of task performance that may help to undermine the fast internal clock of impulsives and reduce their motivation to work for speed (Kendall et al., 1980:180).

The differing characteristics of the reflective - impulsive dimension of cognitive styles can be represented in chart form as follows:

	Reflective	Impulsive
Peruses alternatives carefully	Yes	No
Adopts first hypothesis	No	Yes
Censors many hypothesis	Yes	No
Spends a lot of time evaluating alternatives	Yes	No
Places a large amount of importance on being successful	Yes	No
Prefers an analytic style of thinking	Yes	No
Prefers a relational style of thinking	No	Yes
Is motivated for speed	No	Yes
Thinks out aloud	Yes	No
Has emotional states which intrude on cognitive states	No	Yes

Readence and Baldwin (1978:45) summarize what is known about impulsivity - reflectivity nicely when they cite from Kagan and his colleagues stating that:

They also (1975:45) are careful to indicate that the reflective child is not necessarily the best student at every task.

Lee, Kagan, and Rabson (20) cautioned that one should not assume that a reflective child is a brighter individual or a better learner than his impulsive counterpart. Effective learning on varied intellectual tasks may sometimes require a reflective approach. At other times, an impulsive orientation may be more efficient. Mathematics, they state, may demand a reflective approach, while productivity in the arts may flourish with impulsivity.

There have been a number of studies investigating the relation of impulsivity and reflectivity to reading skills. One of the first of these was done by Kagan (1965) with first graders. Kagan found significant relationships between the cognitive styles of reflection and impulsivity and word recognition. Reflective students made fewer errors in recognizing English words and letters than impulsives. For instance, Butler (1972) investigated the relationship of cognitive style and oral reading by examining the reading miscues of 30 impulsive and reflective second grade boys. In his research, he used the MFF to categorize students as either impulsive or reflective and the Y. Goodman and Burke Reading Miscue Inventory (1972) to classify the miscues that the subjects made in reading.

1. Reflective subjects made more repetitions than did impulsive subjects even when differences in nonverbal intelligence were controlled.
2. Reflective readers corrected a greater percentage of their miscues

impulsive readers even when the intelligence factor was controlled.

3. Response time on the MFF correlated positively with the percentage of miscues corrected.

4. The number of errors on the MFF correlated negatively with the percentage of miscues corrected.

5. No significant difference was found between impulsive and reflective readers with regard to the number of miscues that were semantically acceptable. (Quoted from Readence, 1975:50-51)

In her survey of the literature, Lesiak (1978:334) reports on studies which investigated this dimension of cognitive styles with readers. She states:

Yando (1966) found significant relationships between E (Error score) on the MFF and measures of reading readiness and word discrimination. . . . [in] reading readiness scores . . . only for girls. Banks (1967) found a significant relationship between RT (response time) on the MFF and the word recognition errors of disabled readers. . . (Quoted from Lesiak 1978:334).

Lesiak herself (1978:338) found that reflective first grade girls performed better on three measures of reading ability than did their impulsive counterparts. In her own words, she describes the results of her experimentation in this fashion:

The results indicated that the R - I dimension was a significant variable for first grade girls on word recognition, general

comprehension and critical reading tests. For boys at the first grade level, differences were found only for critical reading scores. At the fifth grade level no differences were found for either sex on the four reading measures . . . The conclusion that reflection results in better developed reading skills is not warranted by the results.

Hallahan, Kaufman, and Ball (1973:582) selected ten low achieving male sixth graders and ten high achieving male sixth graders from 200 white, middle class sixth graders. The group of low achievers was found to contain four impulsive and one reflective subject. The group of high achievers was found to contain four reflective and one impulsive subject. The authors concluded that there is, therefore, a relationship between impulsivity - reflectivity and reading ability.

Denny (1974), using subjects in grades two through five, found no significant differences between good and poor readers on the reflective - impulsive dimension in most cases. He states:

Cognitive tempo data, [that is, data generated from the impulsivity - reflectivity dimension of cognitive style], failed in all instances to distinguish between good and poor readers. Kagan's (1965) findings were upheld only in the case of three significant but moderate correlations between the MFFT errors and Gilmore Oral Reading Test scores. Eleven other correlations between reading and cognitive tempo measures failed to attain significance, raising serious doubt about the importance of this dimension to reading ability (Denny, 1974:707).

Readence (1975) designed a project to investigate the influence of impulsivity - reflectivity on the kinds of cue systems a reader uses to extract meaning from printed words. To examine the manner in which readers obtain meaning from text, the Reading Miscue Inventory was used. To establish the cognitive styles of the subjects, the Matching Familiar Figures test was used. A multivariate analysis of the data revealed that there were no statistically significant relationships between cognitive style and sex with regard to the subjects' use of the linguistic cue system. However, a statistically significant relationship ($p < .05$) between subjects of varying cognitive style was found. This significant relationship was caused by the graphophonic cue system (the sounds and the graphic system) which interacted with the cognitive styles, impulsivity and reflectivity.

Besides these, a number of studies were performed by Hood and others with various groups of students from the first through the fifth grades. In the first reported study, Hood et al. (1973), "... A qualitative analysis of oral reading errors in the study ... revealed more repetitions, regressions, and proportionately more corrections of errors for REF than for IMP S's but the latter made more errors." In their second study, Hood and Kendall (1974) did not find any significant correlations between the impulsive and reflective subjects with regard to the proportion of graphically similar miscues or contextually appropriate miscues. There were, however, differences between the reflectives and impulsives on other measures generated from the Reading Miscue Inventory. In the first place, reflectives corrected a proportionately more miscues than impulsives. In the second place, reflectives were involved with a

lower number of miscues than impulsives. In the third place, differences were found in the proportion of corrected miscues. Reflectives corrected more miscues that were graphically dissimilar. Impulsives corrected fewer miscues that were appropriate for preceding portions of the context but not for following contexts in a sentence. In their later study (Hood and Kendall, 1975:278-9) they found more reflectives than impulsives with low error scores but the differences in the means were not statistically significant as in the case with Butler (1972). They nevertheless state that their findings agree with those of Kagan (1965) but the differences that they found were " . . . less pronounced . . . " than his. They also found that reflectives made a consistently greater number of miscues that were graphically similar to the text.

Shapiro (1974) tested differences in reading readiness between reflectives and impulsives. Reflective first grade boys are better. "Performance on MFF was significantly related to the total score of the reading readiness measure." (Quoted from Readence, 1975:48).

Reports of research linking the reflectivity - impulsivity dimension of cognitive style to reading strategies of individuals can conveniently be summarized in the following chart:

Researcher	Statistically Significant	
	Differences on	Nature of Differences or
	R - I Dimension	Measures used
Kagan (1965)	yes	Word recognition of first graders.
Yando (1966)	yes	Between response time and error scores on MFF and word recognition.
	yes	Between response time for girls on MFF and reading readiness.
Banks (1967)	yes	Response time on the MFF and word recognition of disabled readers.
Butler (1972)	yes	Reflective second graders made more repetitions.
	yes	Reflectives corrected more miscues.
	yes	Response time of impulsives correlated with number of miscues.
	yes	Errors on MFF correlated negatively with corrected miscues.
	no	Number of semantically acceptable miscues.
Shapiro (1974)	yes	Scores on the MFF related to reading readiness measures.
Readence (1975)	no	Between the reflective - impulsive dimension and sex.

	yes	Between graphophonic cue system and the reflective - impulsive dimension.
Lesiak (1978)	yes	Reflective - impulsive dimension for first grade girls on word recognition general comprehension, and critical reading.
	yes	Reflective - impulsive dimension for first grade boys on critical reading.
	no	Reflective - impulsive dimension for first grade boys on word recognition and general comprehension.
Hood et al. (1973)	yes	Reflectives have more repetitions, regressions and more corrections than impulsives.
	yes	Impulsives made more errors.
Hood and Kendall (1974)	no	Between graphically similar or contextually appropriate miscues and cognitive style.
	yes	Reflectives correct more miscues.
	yes	Impulsives make more miscues.
	yes	Reflectives correct more graphically dissimilar miscues.
	yes	Impulsives correct fewer semantically similar miscues that agree with the first part of the sentence but not the

last part.

(1975) yes Reflectives make a consistently greater
number of miscues that are
graphically similar to the text.

From a perusal of the above, it is apparent that there are significant differences between the reading behavior of impulsive and reflective individuals. In the first place, reflectives make fewer reading miscues than impulsives (Hood and Kendall 1973, 1974) and, when they do make miscues reflectives correct more of them than do the impulsives (Butler, 1972, Hood and Kendall, 1974). Both of these facts are used in this study. Reflectives are judged to be better readers than the impulsives: (1) they score better on reading readiness measures (Shapiro, 1974), (2) they score better on measures of critical reading (Lesiak, 1978) and (3) they miscue less frequently yet correct a greater proportion of miscues that they do make (Hood and Kendall, 1973, 1974).

In any case, analyzing miscues that students produce in their processing of written language is problematic, since although many studies have been completed on the analysis of miscues which occur in the reading process, few, if any, have been attempted on the writing process. One of the reasons for this might be that in reading the student is either on-cue or mis-cued within rather narrow limits while in writing free compositions, the students write in such a way that the product of their writing cannot be judged in such a simple or clear-cut fashion. In most free composition, the student is judged as having written a good sentence or a bad sentence. In free composition exercises, only

in spelling or in certain kinds of variance from accepted standards of grammaticallity can students be judged as having mis-cued or being on-cue within the same narrow limits that are applied to reading. This is not true for students who write signalled sentence combining exercises. Students performing these kinds of exercises are on-cue or mis-cued within the same narrow limits as they are when they are reading.

The reason for this is that, if students are asked to read a sentence such as (1) Tell me before I go how to remember a hard word (Burke and Goodman, 1972), the judgement of whether they are on-cued for miscued is narrowly determined. If, for instance, students read the sentence, aurally producing the last phrase as the hard word rather than a hard word, then they are judged as having miscued. The same determination can be made in a signalled sentence combining exercise. For instance, if the students are instructed to combine the following three sentences, (2), (3) and (4), into a fourth sentence (5), and to write the resultant sentence, they may miscue, producing the sentence at (6) rather than the sentence at (5).

2. Wolf was a dog.

3. The dog was strong.

4. The dog was brave.

5. Wolf was a strong and brave dog. (On-cue sentence)

6. The Wolf was a strong and braye dog. (Mis-cued sentence)

It also turns out that signalled sentence combining exercises help in the analysis of spelling miscues. If, for instance, a student writes (7) The store

semed interesting, as one did, it might be supposed that there is only one miscue in the sentence; seemed spelled as semed. But actually, there are two spelling miscues; the on-cue sentence was supposed to be (8) The story seemed interesting. Store in (7) is a miscued spelling for story. Such a piece of information might be difficult to derive from a free written composition. So then, it was determined that miscues from reading elicited using procedures developed by Goodman and his associates (1973) could be compared with miscues collected from signalled sentence combining exercises since both means of obtaining miscues provide student-produced language samples that are miscued or on-cue within clearly defined limits. Any other method for eliciting miscues in writing, it was reasoned, would produce sets of data which could not be compared. However, problems of comparing reading and writing miscues do not end with the elicitation of data.

Some determination has to be made concerning the problems of comparing spoken output with written output. In regard to spelling in writing and sound structure in speech, it is perhaps legitimate to compare the child's substitution of the for this in writing or [ʒə], 'the,' for [ʒɪs], 'this,' in reading. But what is a reading of perplexed as [pɜlcɪst] to be compared with? In an attempt to answer this question, two steps were taken so that data such as the reading of perplexed above could be utilized in the study: (1) the phonetic form was restructured into a written form using the conventions of English orthography, and (2) the restructured form was then compared with the on-cue form (the ER, expected response) and an analysis was made in terms of letter omission, addition, substitution and reversal needed to arrive at the restructured form. Both of these procedures, (1) and (2), are implicitly, if not

explicitly used in Goodman miscue analysis.

Thus, the phonetic form [ps/lekst] would be restructured as perlexed and compared with perplexed. From this it would be concluded that the omission of a p occurred in the miscue. This procedure works quite well for spelling since step (1) is not necessary in the study of written miscues. When a child spells frightened as frighened, it is obvious that a consonant is missing.

This kind of analysis of spelling in writing and phonological miscues in reading yields the following results: For the whole group, the number of miscues in reading vary directly with the number of miscues in writing as indicated by a Pearson product - moment correlation which yields an r of .81938, $p < .001$. Such a finding would seem to contradict a related finding of Mosenthal (1976), who appears to have discovered evidence that indicates a difference between the strategies that young students use in reading and those that they use in writing. From this it might appear that the Mosenthal finding might be attributed to the fact that he dealt primarily with semantics in his research. The research here deals largely with the processing of linguistic items as forms. In any case, the records of the students were divided into three groups. Those whose reading miscue inventory showed more than 4.9 miscues per hundred words and those whose miscue inventories showed less than 3.0 miscues per hundred words and all others. The first of these three groups was designated as the impulsives while the second was designated, the reflectives. Such a procedure would seem to be legitimate since Hood and Kendall have reported that impulsives do in fact have a higher error rate than reflectives in reading (1975:273). Furthermore, since reflective readers correct a greater

percentage of their miscues than do impulsive readers even when the intelligence factor is controlled, this also is a factor which can be used here to establish the classes of impulsive and reflective readers (Butler, 1972, Readence and Searfoss, 1975:93.)

Of the 16 students in the study with complete records, half of them were in these two groups, four in each. Interestingly enough, the reflectives as a group made more miscues in reading (59) than in writing (30); the impulsives showed the reverse trend (139 writing, 111 reading). An analysis of variance

Impulsives and Reflectives Reading Miscues

	Group	Number	Mean	Variance	Std. Dev.
Reflectives	1	4	15.5	9.666667	3.1091263
Impulsives	2	4	29.5	133.6667	11.561431
	Mean Diff.		Var. Diff.		Std. Dev. Diff.
	14		35.833335		5.9860952

T Ratio of 2.3387533 on 4 Degrees of Freedom

Impulsives and Reflectives Writing Miscues

	Group	Number	Mean	Variance	Std. Dev.
Reflectives	1	4	8.25	27.58333	5.2519837
Impulsives	2	4	37.25	140.91667	11.870833
	Mean Diff.		Var. Diff.		Std. Dev. Diff.
	29		42.125001		6.4903376

T Ratio of 4.4468153 on 4 Degrees of Freedom

<u>Impulsives and Reflectives Reading and Writing Miscues</u>					
	Group	Number	Mean	Variance	Std. Dev.
Reflectives	1	8	33.4	134.83929	11.612032
Impulsives	2	8	11.9	30.982143	5.566160
	Mean Diff.		Var. Diff.		Std. Dev. Diff.
	21.5		20.727679		4.5527661
T Ratio of 4.7224 on 10 degrees of freedom					

Table I: Analysis of Variance for Impulsives and Reflectives on Reading and Writing Miscues

**Significant at or beyond the .01 level of probability, one-tailed test.

*Significant at or beyond the .05 level of probability, one-tailed test.

(Table I) reveals that, on the basis of miscues, these students can be separated into two clearly defined groups. In the writing miscues, the analysis of variance of the miscue scores of the reflectives and impulsives generated a t of 4.46815 which is significant at the .05 level of probability, indicating that these two groups of students miscued in distinctively different ways. Although the reading miscues do not generate a statistically significant difference, the great difference in the standard deviations and the difference in the variance between the two groups come very close to being statistically significant. The combined reading and writing miscues show such a statistically significant difference with a t of 4.72240 which is significant at the .01 level of probability, two-tailed t test. Besides this, with one exception these eight students can be separated into groups of impulsive and reflective readers; with only one exception, the reflectives corrected a greater proportion of miscues

than the impulsives. The same is not true of the whole word miscues. The impulsives could not be separated from the reflectives on the basis of omission of nouns, verbs and so on or the substitution of one lexical item for another and so on.

At this point, the question can be asked: What does it mean in concrete terms if the miscues in reading of a particular student correlate with the miscues in writing on the level of spelling and pronunciation? It means that a child, to cite one example, has the tendency to write theif for thief and to read trail for trial in the area of vowel consonant reversals. It also means that the child who reads he told as he hold (h substituted for t) is also likely to spell discussion as discution (t substituted for ss) in the area of consonant substitutions. Similarly, the child who reads Jock as Jack is likely to write medicine as midicine, or the child who writes village for village is likely to read remainder as reminder. The same might be said for the child who reads not for note and writes techer for teacher, an example of vowel omission in reading and writing. Thus, it would appear from a perusal of Table II that the large

	Impulsives			Reflectives			Entire Group
	Writing Miscues	Reading Miscues	Correlation	Writing Miscues	Reading Miscues	Correlation	
Additional Consonant	15	13	.70251	4	8	.81649*	.19657
Additional Vowel	7	10	.28171	5	2	-.57735	.31739
Vowel Consonant Reversal	8	7	.30151	3	3	-.33333	.34499
Omitted Consonant	37	26	.23240	8	11	.47140	.38341

Omitted Vowel	36	12	.94491**	7	7	-.34585	.17345
Substituted Consonant	21	12	.91425*	4	14	.73029	.52639*
Substituted Vowel	8	21	.95784**	0	3	.58824	.54269*
All Miscues							.81938**

Table I: Pearson Product Moment Correlation of Reading and Writing Miscues
of Spelling and Phonology

**Significant at or beyond the .01 level of probability, one-tailed test.

*Significant at or beyond the .05 level of probability, one-tailed test.

degree of correlation for the entire group resides to a great extent in the fact that the impulsive evidence similar patterns in substituting one vowel for another or one consonant for another in reading and writing or omitting vowels in both reading and writing. This study did not investigate the more narrow question of whether the child who reads bark for dark also writes bad for dad; that is, the study did not investigate the question of whether particular consonants (or sets of consonants) were substituted for each other in both reading or writing. Neither was this matter pursued in reference to vowels, but from evidence in hand it appears that students who substitute one vowel for another or one consonant for another are the students who make substitution miscues involving both vowels and consonants at least in writing ($r = .75480$ $p < .001$).

In any case, although the study as a whole did not show statistically

significant correlations with vowel or consonant reversals, there was a tendency to find these miscues in the writing and reading of individual students so that the student who spelled sentence as sentense also read broad as board. The same can be said for the student who adds vowels and consonants, reading every for ever or spelling had as head. The reason that reading miscues did not correlate with writing miscues for some students or groups of students might be simply that the number of miscues involved in some categories is rather small. In any case, it is not exceptional that students should make these kinds of miscues; all of the subjects, except the very good ones, made these kinds of miscues now and again. Further study from a greater body of evidence might show that statistical significance between reading and writing miscues might be reached in every category.

It should not be surprising that there should be differences in the way children who are divided into two groups, here designated impulsives and reflectives, process reading and writing as manifested in the difference in the correlation between reading and writing miscues. It would seem that this would tend to support the contention made elsewhere (Ney, 1974) that students can be grouped according to the manner in which they process written language. Some students apparently use different strategies from other students resulting in differing patterns on miscue inventories. Not every researcher feels that this is the case. Gibson and Levin (1975:335-40) seem to feel that there is little or no relation between reading and spelling. The above indicates that there is at certain points. Thus also, the evidence presented so far indicates the probability that a model similar to the one developed in the Chomskyan approach to English orthography is, at least, in part correct: Spelling and phonology

are related to one another insofar as they are related by rules to a common underlying form. This would seem to follow from the previously mentioned fact that the total number of reading miscues in phonology correlates very highly with the total number of writing in spelling for all students ($r = .81938$, $p < .001$).

Following Kolars (1973:40-41), substitutions, omissions and additions of entire words were studied according to their membership in various grammatical form classes. The target words were also separated into those which were three letters or shorter and those which were four letters or longer to see if word length had any effect on the occurrence of miscues. (Target word here is the word to be read or written; ER (expected response) in Goodman's terms.) The results can be seen in Tables III through V. A cursory examination of these tables reveals that the students in the study were systematically involved in a higher proportion of addition and substitution miscues in reading than in writing. For omission miscues, the reverse is true; these students were involved in a greater number of omission miscues in reading than in writing. Only for the omission of pronouns did the miscue scores appear similar with a correlation .97373, significant at the .001 level of probability. This generalization holds true for content words as well as function words. Furthermore, one fact about omission miscues is quite startling: When they read, young students never are involved with miscues of omissions involving nouns. They occasionally omit a verb or an adjective or an adverb, but in the data collected so far they have never been found to omit nouns. This is not true in writing where they omit nouns just more frequently than they omit pronouns and just as frequently as they omit conjunctions. In fact, the combined total of the omission of nouns

TABLE III: MISCUES IN READING WHICH EXCEED MISCUES IN WRITING BY A RATIO OF 2:1 OR GREATER

	Three letters in length or less			Four letters in length or more		
	Writing	Reading	Ratio	Writing	Reading	Ratio
<u>Miscues Involving Function Words</u>						
Additional <u>a/an</u>	2	5	1:2.5			
Additional <u>the</u>	5	13	1:2.6			
Additional Preposition	1	18	1:18	0	1	0:1
Substitution of Auxiliary	0	4	0:4	0	4	0:4
Substitution of Conjunction	0	9	0:9			
Substitution of Demonstrative Determiner	0	2	0:2	0	3	0:3
Substitution of Definite Determiner <u>the</u>	4	13	1:3.3	1	10	1:10
Substitution of Pronoun	1	26	1:26	0	6	0:6
Omission of Poss- essive Determiner	0	4	0:4			
Omission of Negative	0	1	0:1			
<u>Miscues Involving Content Words</u>						
Substitution of Noun				3	17	1:2.3
Substitution of Verb	0	3	0:3	5	14	1:2.8
Substitution of Adjective				1	4	1:4
Substitution of Adverb	0	2	0:2	0	11	0:11

TABLE IV: MISCUES IN WRITING WHICH EXCEED MISCUES IN READING BY A RATIO OF 2:1 OR GREATER

	Three letters in length or less			Four letters in length or more		
	Writing	Reading	Ratio	Writing	Reading	Ratio
<u>Miscues Involving Function Words</u>						
Additional Auxiliary	7	4	1.75:1	7	2	3.5:1
Substitution of Indefinite Determiner <u>a/an</u>	4	0	4:0			
Omission of Conjunction	22	8	2.75:1	1	3	1:3
Omission of Definite Determiner	25	11	2.27:1			
Omission of Pronoun	11	4	2.75:1			
Omission of Relative Pronoun <u>which/who</u>	2	0	2:0	4	0	4:0
Substitution of Relative Pronoun <u>which/who</u>	20	0	20:0	17	0	17:0
<u>Miscues Involving Content Words</u>						
Additional Noun	10	0	10:0	4	1	4:1
Substitution of Noun Phrase				3	0	3:0
Omission of Adjective	3	2	1.5:1	21	1	21:1
Omission of Prepositional Phrase				12	1	12:1
Omission of Verb	3	0	3:0	28	4	7:1
Omission of Verb Phrase				15	0	15:0

TABLE IV: MISCUES IN WRITING WHICH EXCEED MISCUES IN READING BY A RATIO OF 2:1 OR GREATER

	Three letters in length or less			Four letters in length or more		
	Writing	Reading	Ratio	Writing	Reading	Ratio
<u>Miscues Involving Content Words (cont'd)</u>						
Omission of Noun	22	0	22:0	19	0	19:0
Omission of Noun Phrase				25	0	25:0
Omission of Noun	3	0	3:0	28	4	7:1
<u>Miscues Involving Inflections</u>						
Agreement of Subject-Verb	11	0	11:0	1	1	1:1
Additional ING-form				0	2	0:2
Additional Past Tense Marker	0	1	0:1	8	2	4:1
Omission of ING-form Determiner				8	2	4:1
Substitution of ED-form	2	0	2:0	5	1	5:1
Substitution of EN-form for ING-form				3	1	3:1

TABLE V: MISCUES IN READING AND WRITING WHICH SHOW A LESS THAN 2 TO 1 RATIO

	Three letters in length or less			Four letters in length or more		
	Writing	Reading	Ratio	Writing	Reading	Ratio
<u>Miscues Involving Function Words</u>						
Additional Pronoun	11	9	1:1.2	5	2	2.5:1
Omission of Indefinite Determiner <u>a/an</u>	5	5	1:1			
Omission of Prepositions	18	13	1.4:1	1	1	1:1
Substitution of <u>a/an</u> for <u>the</u>	4	4	1:1			
<u>Miscues Involving Content Words</u>						
Additional Adverb	0	1	0:1	1	0	1:0
Additional Verb Noun Phrase				2	2	1:1
Omission of Adverb				6	8	1:1.3
Substitution of Verb				2	3	1:1.5
<u>Miscues Involving Inflections</u>						
Additional Z-plural				5	6	1:1.2

and noun phrases (31) is greater than the next most frequently occurring omission miscue, the omission of conjunctions (18). This particular fact might be a function of the frequency of occurrence of a particular form class in English; nouns and noun phrases might simply occur more frequently than other parts of speech. But it is a startlingly fact, nevertheless, and may indicate something of the difference between reading and writing. Besides this, an analysis of variance reveals that the two groups discussed above, composed of those instances where writing miscues exceeded reading miscues by 2:1 and those instances where reading miscues exceeded writing miscues by 2:1, differ from each other at the .01 level of confidence and beyond. (See Tables VI and VII.)

Means, Variance and Standard Deviations of Two Groups of Unpaired Data

Reading Miscues Compared to Writing Miscues, Function Words, 2:1 Data

Group	Number	Mean	Variance	Standard Deviation
1	15	7.9333333	49.923809	7.0656783
2	15	.93333333	2.4952381	1.5796323
Mean Difference		Variance Difference		Variance Difference
7		3.4946031		1.8693858
T Ratio	3.7445454	on 15.395978	degrees of freedom	

Significant at the .01 Level of Probability, two-tailed t-test

Means, Variance and Standard Deviations of Two Groups of Unpaired Data

Reading Miscues Compared to Writing Miscues, All Words, 2:1 Data

Group	Number	Mean	Variance	Standard Deviation
1	21	8.0952381	45.090476	6.7149443
2	21	1.0952381	2.8904762	1.7001401
Mean Difference		Variance Difference		Variance Difference
7		2.2848072		1.5115579
T Ratio	4.6309837	on 22.553662 degrees of freedom		

Significant at the .01 Level of Probability, two-tailed t-test

Means, Variance and Standard Deviations of Two Groups of Unpaired Data

Reading Miscues Compared to Writing Miscues, Function Words, 1:2 Data

Group	Number	Mean	Variance	Standard Deviation
1	9	11	82.5	9.082951
2	9	3.5555556	14.527778	3.8115322
Mean Difference		Variance Difference		Variance Difference
7.444444		10.780864		3.2834226
T Ratio	2.2672817	on 10.737267 degrees of freedom		

Significant at the .05 Level of Probability, two-tailed t-test

Means, Variance and Standard Deviations of Two Groups of Unpaired Data

Reading Miscues Compared to Writing Miscues, All Words, 1:2 Data				
Group	Number	Mean	Variance	Standard Deviation
1	18	11	76.941176	8.771612
2	18	2.2777778	9.3888888	3.0641293
Mean Difference		Variance Difference		Variance Difference
8.7222222		4.7961147		2.1900033
T Ratio	3.9827438	on 21.08804 degrees of freedom		

Significant at the .01 Level of Probability, two-tailed t-test

Tables VI and VII: Differences between Reflectives and Impulsives

In the two cases where reading and writing miscues of omission are more or less equivalent, the omission of the indefinite determiner a/an and the omission of prepositions, the units are less than two letters in length except for three prepositions out of thirteen in the reading miscues and two out of eighteen in the writing miscues. It may be that the length of the shorter units causes them to be skipped more easily and hence miscues involving shorter elements contribute proportionately more to the total number of miscues in reading but not in writing. In any case, in the two instances where the writing miscues of omission exceed the reading miscues of omission, the total number of instances was extremely small (one omission of the negative particle, no, and four instances of the possessive determiners, his, her and etc.)

Again the question can be asked: In concrete terms, what does this

mean? It means that students are more likely to read He knows the magic than they are to write Strange people were appearing at the windows for Strange people were appearing at windows. It means also that they are more likely to read . . . take any chances . . . for . . . take a chance . . . than they are to write An elephant which was big and dirty for The elephant which was big and dirty . . . But on the other hand, they are less likely to read Lest man resent for Lest man resent them than they are to write They laughed at the quiet and considered for They laughed at the quiet and considerate man. This is summarized in the following chart:

Chart I: Examples of Miscues

<u>Reading more likely</u>		<u>Writing less likely</u>
Additional determiner, <u>the</u>		
He knows the magic.	OR	Strange people were appearing at the windows.
FOR He knows magic.	ER	FOR Strange people were appearing at windows.
Substitution of determiner		
. . . take any chances	OR	An elephant which was big and dirty . . .
FOR . . . take a chance	ER	FOR The elephant which was big and dirty . . .
<u>Reading less likely</u>		<u>Writing more likely</u>

Lest man resent.

OR

They laughed at the quiet and
considerated.

FOR Lest man resent them.

for They laughed at the quiet
and considerate man.

To this point, then, a study of miscues in reading and writing of fourth grade students has revealed two facts of importance: (1) miscues of phonology in reading and spelling in writing correlate very highly, indicating that, on the level of decoding the written word into sound or encoding meaning into the written word, reading and writing are similar processes. (2) Miscues of addition, omission and substitution show distinctively different patterns for reading and writing -- the miscues of addition and substitution are more frequent in reading; the miscues of omission are more frequent in writing. It is hypothesized here that the reason for this can be stated in somewhat the following fashion: Miscues of phonology and spelling have as their source the manner in which linguistic units are stored in the mind and by the manner in which rules relate these underlying forms to surface forms. The phonology and the spelling of words as linguistic units are related to one another insofar as they are related by rule to the same underlying form as in a Chomskyan grammar. (See Figure I.)

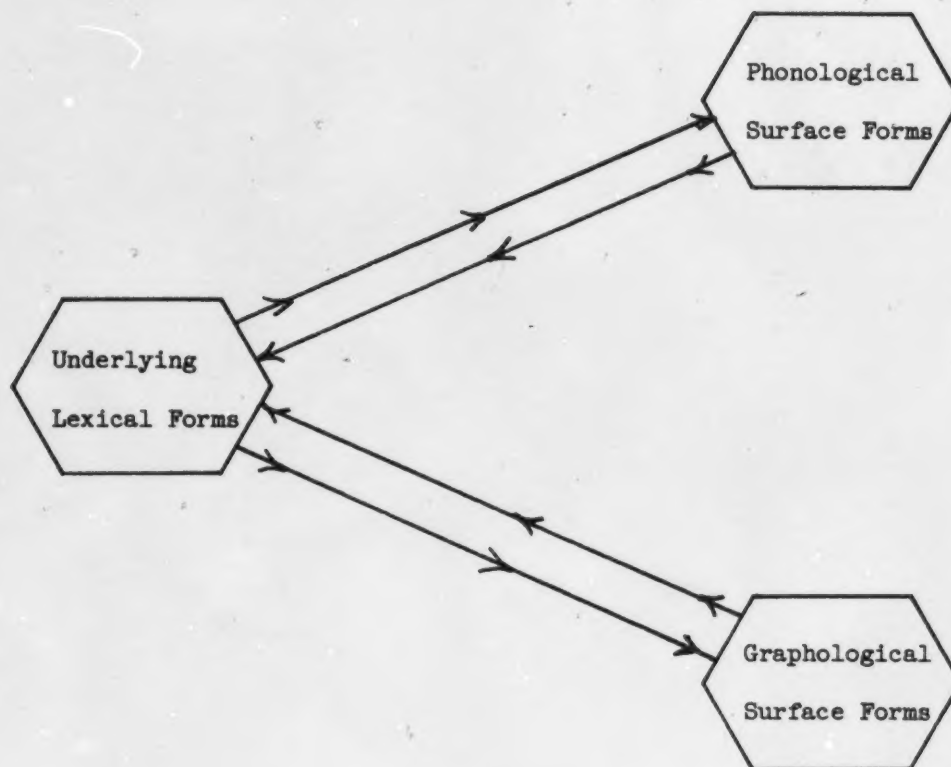


Figure 1: The Chomsky and Halle Model for Relating Graphological
Forms to Phonological Forms

Underlying lexical forms are mapped into phonological surface forms
on the one hand and graphological surface forms on the other.

If the items are not stored after the manner of adult norms and if the rules
are not internalized in such a way that they produce the forms characteristic of
the adult norms, the students will make a mismatch between the word in the text

and their pronunciation in reading or spelling in writing. Such an explanation as this is obvious for written forms such as solushon for solution or discution for discussion where spelling rules applicable for some forms in the language are applied to the wrong forms. In this manner, the data indicate that generalized processes are the source of phonological miscues in reading and spelling miscues in writing. It would thus appear that phonology and spelling miscues are due to the manner in which young native speakers have stored underlying forms in memory and related them to surface forms by rule and are related to the students' stage of linguistic and/or cognitive development and their cognitive style. For the miscues involving addition, substitution and omission of entire words, the situation is somewhat different. Miscues here are the result of the manner in which students process words in reading and writing. They are the result of decoding and encoding strategies based on acquired skill (Ney, 1974). In the application of these strategies, reading and writing turn out to be quite different processes. Thus, spelling and phonology miscues in reading and writing are attributed to one type of cognitive process, related to the manner in which children acquire language and develop linguistic rules. Addition, substitution and omission miscues involving lexical / syntactic / semantic units are attributed to acquired skills involving low level cognitive strategies which operate somewhat differently in reading and writing.

Further support for this comes from the following evidence: When a miscue of phonology is made by a young reader, for instance, when a young student reads pencil (OR) for penicillin (ER), the chances are two to one that the frequency of the (OR) will be higher in a word frequency list than the (ER). (Laboratory confirmation for this kind of a phenomenon can be found in Solomon and Postman (1952), Howes and Solomon (1951) and Rosenzweig and Postman (1958).)

This would seem to indicate that the underlying forms of words used in the reading process are stored in terms of their frequency; the more frequent having a more secure place in storage. Thus the student usually reads the more frequent form and thus also the miscues of phonology (pronunciation) are due to the manner in which items are as underlying forms or related to surface forms by rule. And since phonological and graphological surface forms are related to each other insofar as they are related to the same underlying form, miscues of phonology in reading and spelling in writing tend to be quite similar for any given student. The word frequency effect noted above seems to support at least the generalizations regarding reading - phonology miscues in this study.

In regard to the manner in which linguistic units are processed with the use of decoding and encoding skills, the difference between reading and writing can be discerned most readily in reference to the miscues of omission. The larger linguistic units measured in terms of the number of letters per unit are very seldom omitted in reading but are quite frequently omitted in writing. This can be partly attributed to their length and to their importance to the task of extracting meaning from a text. The shorter units, the function, words act mostly as sentence glue, holding the words together; they do not contribute much to the meaning of any given sentence. Hence, young readers correctly attribute less importance to them, skipping them more frequently in reading. It would appear that the eye, in making its saccades in reading, skips over the shorter items but carefully processes the larger items which are also more important semantically for the extracting of meaning from text. But in writing where the pencil moves more slowly than the mind, young writers are quite sure that they have written the larger items which are more central to the meaning of the text; as a result, they concentrate on getting the smaller items down on

paper and skip the nouns and adjectives. (The one exception to this in this study can be found in the omission of the auxiliaries where reading and writing miscues correlate quite highly (r .514797 significant at the .05 level of probability with 18 degrees of freedom).)

At this point, it is perhaps advisable to look at the reading and writing miscues of selected individuals from the groups typified as reflectives impulsives to see how they differ in processing written English in reading and writing. The first of these is the most noticeable of the impulsives who seems to treat the visual material in a rather cavalier manner. He shows the highest rate of miscuing in reading, making a total of 2.12 phonological miscues per hundred words and 3.4 lexical / syntactic / semantic miscues per hundred words for a total of 5.5 miscues per hundred, the highest in this study. It is, however, the nature of his miscues which typify him as an impulsive as in the following:

Expected Response	Observed Response
1. But no one gives flowers away . . .	But those who gives flowers away . . .
2. He pressed it in return.	And pressed it in return.
3. As he pushed the cans this way and that and arranged . . .	And pushed the cans this way and arranged . . .
4. . . . thought . . .	. . . brought . . .
5. They are a dollar and a half.	They're ten dollars and a half,
6. . . . dollar fifty . . .	. . . fifty dollar . . .

Furthermore, this impulsive student uses very few regressions for the correction

of miscues, correcting only 6% of the phonological miscues and 20% of the lexical / syntactic / semantic miscues.

His written miscues are similar. Although, in this study, the miscues per hundred words of writing are not a significant figure since not all students completed the same exercises, yet in the completed exercises, this individual had 53 spelling miscues in writing which is comparable to his 33 phonological miscues in reading. His writing miscues, in many respects, are like his reading miscues. There is a wide divergence between the expected response and the observed response.

Expected Response	Observed Response
7. The crowd, which was growing,	The corud became big was growing.
8. The happy and contented people watched the dance.	The people appe and contented danced.
9. They laughed at the quiet and considerate man.	They laughed at the quiet and considerated.

The number of miscues in both reading and writing of this impulsive student are proportionately very high.

On the other hand, the reflective students can be easily spotted. One of these is even meticulous. (From this point, this reflective student will be referred to as the meticulous student.) Such a student is characterized by a very slow and deliberate oral reading rate of 140 words per minute rather than

the more normal 225 words per minute. The meticulous student's reading is also characterized by a high percentage of regressions in reading for correction. In contrast to the impulsive student's correction of 6% of the phonological miscues and 20% of the lexical / syntactic / semantic miscues, the reflective reader corrected 17% of the phonological miscues and a full 55% of the lexical / syntactic / semantic miscues. At this point, it might be pointed out that the meticulous student's miscue analysis looks very much like that of a good student. In this study, a good student, who was also a reflective student, produced 1 phonological miscue per hundred words and 1.5 lexical / syntactic / semantic miscues per hundred words for a total of 2.5 miscues per hundred words. The meticulous reader produced 1.1 phonological miscues per hundred words and .6 lexical / syntactic / semantic miscues per hundred words for a total of 1.7 miscues per hundred words. Similarly, the good student made regressions to correct 19% of the phonological miscues and 46% of the lexical / syntactic / semantic miscues; these compare very closely to the 20% and 55% of the meticulous reader. Both the meticulous reader and the good student are reflectives.

Not only did the meticulous student read at a slower rate than most of the other students; she also wrote at a slower rate than the majority of students, frequently not finishing exercises in the allotted time. Judging by the total number of miscues in both reading and writing, the meticulous student seems to be a very good student, but judging by other factors, this may not be the case. Table VIII graphically demonstrates the difference among the three students discussed here.

In conclusion, then, a study of miscues in reading and writing would

suggest that they should not be kept apart in the instructional process as they frequently are since (1) on one level, at least, they are the same, and (2) they are governed by the cognitive style of the students. The first is true because the manner in which young students pronounce (or mispronounce) words in reading is related to the manner in which they spell (or misspell) words in writing. It would therefore seem counter-productive to keep reading, writing and spelling apart as they are so often kept apart by teachers and teaching materials. Materials for the teaching of reading and writing and spelling should obviously be related so that students are aided in their attempt to store underlying forms in memory and in their effort to form rules which relate the underlying forms thus stored to the pronunciation of items that they read and the spelling of the items that they write.

Furthermore, the reflectives showed a much higher correlation between the number of reading and writing miscues ($r = .90839$ $p > .001$) than either the total group of students ($r = .81938$) or the impulsives ($r = .43596$ n.s.).

Similarly, the same general principle applies to the teaching of other aspects of reading and writing. From a study of miscues, it is apparent that the language processing skills for reading and writing are somewhat different since young students omit a higher proportion of content words in writing than they do in reading. But the response in the instructional process must be similar. Reading and writing should be taught as mirror images of the same process and the students must be clearly instructed in this difference so that their skills may be enhanced. For the teaching of the phonological aspects of reading and spelling, reading and writing must be taught together so that similarities can be strengthened; for the lexical / syntactic / semantic aspects

of reading and writing, the two skills must be taught together so that differences can be pointed out.

Furthermore, just as there exists in the Goodman model for reading (1970:30-1) a monitoring phase in which readers compare their first impression with the visual cues that they have picked up, so it is apparent that in the writing process, there is a monitoring phase in which the students compare what they have put down on paper to the mental image that they are retaining in memory and, for writing, this monitoring phase requires reading. A greatly simplified diagram of this phase of the writing process can be seen in Figure II. It is hypothesized that the high proportion of the omission of content words and some function words in writing is attributable to the fact that not only do the students miscue in the writing of a word or phrase but they miscue in the reading of the monitoring phase. They read what they think is there. Consequently, since reading and writing are so intimately linked, they should not be separated in the instructional process.

Even further evidence for this close link between reading and writing can be found in the study of the reading and writing miscue records of individual students. Those students who miscue extensively and violate the meaning and the syntax of the original rather seriously in reading will be inclined to do the same in writing. The same can be said for the careful readers. Thus, it would seem that just as reading strategy lessons can be devised on the basis of the miscue records of readers (Piper, 1975), so also writing strategy lessons can be designed on the writing miscues of individual students. From this study, it appears that such lessons could be designed for groups of students who have similar records, thus obviating the necessity of

designing a different course of instruction for each student.

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